

1 **Marquis & Aurbach**
2 JASON M. GERBER, ESQ.
3 Nevada Bar No. 9812
 10001 Park Run Drive
 Las Vegas, NV 89145

4

DONGELL LAWRENCE FINNEY LLP
MICHAEL C. HETEY, ESQ.
mhetey@dlflawyers.com
Nevada Bar No. 5668
RICHARD A. DONGELL, ESQ. (PHV)
rdongell@dlflawyers.com
THOMAS F. VANDENBURG, ESQ. (PHV)
tvandenburg@dlflawyers.com
MICHAEL E. GALLAGHER, ESQ. (PHV)
mgallagher@dlflawyers.com
2300 West Sahara Ave., Suite 800
Las Vegas, NV 89102
Phone: (702) 856-4558
Fax: (702) 856-4301
Attorneys for Defendants Maryland Square
Shopping Center, LLC, the Herman Kishner
Trust dba Maryland Square Shopping
Center, Irwin Kishner, Jerry Engel, Bank of
America, as Trustees for The Herman
Kishner Trust, and Maryland Square, LLC
and the Clark County School District

**UNITED STATES DISTRICT COURT
DISTRICT OF NEVADA**

PETER J. VOGGENTHALER; VICTOR BECERRA; ARTHUR BODENDORFER; BRENDA C. CHAFFIN; MICHAEL J. SOLMI; JASON COWLES; JANE GAUTHIER; HONORE GAUTHIER; NIKOLAS KONSTANTINOU; DRAGAN KURAJICA; KENNETH LOWTHER; JAMES LUEHMANN; JACQUELINE LUEHMANN; RUTH MANNHEIMER; WILLIAM MONTERO; BARBARA MONTERO; CLIFFORD ROGERS; SHARON ROGERS; HERMANN ROSNER; MARKUS ROTHKRANZ; DANIEL SOLDINI; CHARLES WALKER; VERA WALKER; JACK YENCHEK; OFELIA YENCHEK; RICHARD MALM; ROGER ELLSWORTH; JO ANN ELLSWORTH; MARGARET RUDELICH-HOPPE; PATRICIA MAHONEY, individually and as trustee for the MAHONEY LIVING TRUST; RICHARD FALEN; PETER LEARNED; KRISTIAN MEIER; ELIZA ACOSTA; MIRHA ELIAS; AIKO BERGE

Case No.: 2:08-cv-01618-LDG-GWF

**DECLARATION OF ROBERT A. HOWE
IN SUPPORT OF SUPPLEMENTAL
OPPOSITION TO MOTION FOR
SUMMARY JUDGMENT**

MARQUIS & AURBACH
10001 Park Run Drive
Las Vegas, Nevada 89145
(702) 382-0711 FAX: (702) 382-5816

1 Plaintiffs,
2
3 vs.
4 MARYLAND SQUARE, LLC; MARYLAND
5 SQUARE SHOPPING CENTER LIMITED
6 LIABILITY COMPANY; HERMAN KISHNER
7 dba MARYLAND SQUARE SHOPPING
8 CENTER; IRWIN KISHNER, JERRY ENGEL,
9 BANK OF AMERICA as Trustees for the
10 HERMAN KISHNER TRUST; CLARK
11 COUNTY SCHOOL DISTRICT; THE
12 BOULEVARD MALL, as successor-in-
13 interest/surviving corporation/agent for
14 BOULEVARD ASSOCIATES, LLC;
15 BOULEVARD MALL I LLC, as successor-in-
16 interest/surviving corporation/agent for
17 BOULEVARD ASSOCIATES, L.L.C.;
18 BOULEVARD MALL II LLC, as successor-in-
19 interest/surviving corporation/agent for
20 BOULEVARD ASSOCIATES, LLC;
CONSTRUCTION DEVELOPERS INC.;
FEDERATED WESTERN DEPT. STORES,
INC.; GENERAL GROWTH PROPERTIES;
MELVIN SHAPIRO; SHAPIRO BROS.
INVESTMENT CO.; DELIA'S CLEANERS OF
ARIZONA, INC.; CB RICHARD ELLIS

Defendants.

16
17 MARYLAND SQUARE SHOPPING CENTER,
18 LLC, THE HERMAN KISHNER TRUST DBA
19 MARYLAND SQUARE SHOPPING CENTER,
20 IRWIN KISHNER, JERRY ENGEL, BANK OF
AMERICA, AS TRUSTEES FOR THE
HERMAN KISHNER TRUST, MARYLAND
SQUARE, LLC AND THE CLARK COUNTY
SCHOOL DISTRICT'S,

21 Third Party Plaintiffs,
22 vs.
23 GENERAL GROWTH MANAGEMENT, INC.,
24 a foreign corporation; BOULEVARD MALL,
25 LLC, a foreign limited liability company;
SEARS ROEBUCK & CO., a foreign
corporation; GOOD YEAR TIRE & RUBBER
CO., a foreign corporation; WIENS
PROPERTIES, LLC, a Nevada Limited Liability
Company; TERRIBLE HERBST, INC., a
Nevada corporation, SUPERIOR TIRE, INC., a
dissolved Nevada corporation, DR. CLEAN
MANAGEMENT, INC., a revoked Nevada
corporation, THE HOYT CORPORATION, a

1 Maryland corporation, BOWE PERMAC, INC.,
2 a Texas corporation, and GOSS-JEWETT &
CO., a suspended California corporation.

3 Third Party Defendants.
4

5 I, Robert A. Howe, declare as follows:

6 1. I am one of the Experts disclosed by the Maryland Square Defendants in this
7 action. My report, opinions, supporting documentation, and rebuttal opinions have been
8 disclosed during this litigation.

9 **BACKGROUND AND EXPERIENCE**

10 2. I have over 20 years of experience in planning and implementing remedial
11 investigations/feasibility studies (RI/FS) and all other phases of remediation at hazardous waste
12 sites. Many of the facilities I have been involved with have required development of plans and
13 ultimately decision documents that comply with the requirements of the National Contingency
14 Plan (NCP).

15 3. I have extensive experience using modern methods and advanced strategies for
16 the cleanup of contamination at former dry cleaner sites and other types of hazardous waste sites
17 that involve sampling and analysis to support the quantification of risks associated with soil,
18 groundwater, and vapors.

19 4. As a former environmental laboratory manager, field geologist, and senior project
20 manager, I understand every aspect of field projects, from planning through regulatory
21 negotiation, implementation, preparation of decision documents, and litigation support.

22 5. Many of my RI/FS efforts have involved sites with long histories of operation and
23 complex conceptual site models (CSMs). As a technical advisor or project manager, I have
24 worked at many chlorinated solvents sites located across the U.S.

25 6. I am familiar with most of the emerging state and federal requirements being used
26 to identify and remediate risk related issues relative to vapor intrusion.

27 7. I have been involved with numerous litigation support efforts at large and small
28 hazardous waste sites as a technical support person and technical expert.

1 8. I have been retained and have testified in a previous court case in support of
 2 Environmental Protection Agency (EPA) Region V and the U.S. Department of Justice (DOJ) in
 3 the case of case of U.S. vs. Apex Oil Company ILS, 05-2420 that dealt specifically with
 4 imminent threats to human health and the environment from groundwater and vapor related
 5 issues.

6 **PCE IN GROUNDWATER BENEATH THE SITE DOES NOT POSE AN IMMINENT**
 7 **AND SUBSTANTIAL THREAT TO HUMAN HEALTH AND THE ENVIRONMENT**

8 9. A stable dissolved-phase plume of tetrachloroethylene (PCE) is present in the
 9 shallow nuisance aquifer present beneath the area down gradient of the Maryland Square Mall
 10 and Boulevard Mall located in Las Vegas, Nevada. Multiple potential sources of this shallow
 11 regional groundwater PCE plume have been identified. Including the Dr. Clean facility located at
 12 1195 E. Desert Inn Road, Las Vegas, Nevada. Dissolved-phase PCE concentrations at this site
 13 are similar to those found at the other currently identified potential source area, the former Al
 14 Phillips the Cleaner (APTC) site located at 3661 South Maryland Parkway, Las Vegas, Nevada.

15 10. The dissolved-phase PCE plumes from these two sites do not pose a threat to
 16 human health or the environment through ingestion or direct contact. The shallow aquifer is non
 17 potable because of high total dissolved solids, metals, and odors and has no beneficial use now or
 18 in the foreseeable future in the Las Vegas Valley. The shallow aquifer is vertically isolated from
 19 any potable water source in the area by over 300 feet of non-porous clay. Hydrogeologic
 20 gradients in the potable water sources in the area are upward in the Las Vegas Valley, which
 21 means that water from deeper zones are under pressure and would tend to create upward pressure
 22 that further restrict any downward movement of the shallow nuisance shallow groundwater
 23 beneath the area (See Ex. A, Zikmund, 1996).

24 11. Neither of the above identified potential sources of the regional PCE shallow
 25 groundwater plume represents a substantial source of contamination, and are the result of
 26 releases of lesser amounts of PCE from former dry cleaner operations. Previous investigations
 27 have focused on the APTC site, but have failed to properly characterize the Dr. Clean facility and
 28 other potential sources of PCE in the area. Only three permanent wells have been placed down

1 gradient of the Dr. Clean site, far fewer than have been installed near the former APTC facility
 2 even though the levels of PCE in shallow groundwater beneath both of the identified sources are
 3 very similar (See Ex. B, OGI, 2010). The two source areas naturally funnel into the same
 4 residential areas where the regional PCE shallow groundwater plume is present (See Ex. C,
 5 Howe, March 2010).

6 12. Based on a review of the Nevada Department of Environmental Protection
 7 (NDEP) well database performed by Tetra Tech in conjunction with Mr. Steve Walmsley, Staff
 8 Engineer for the Nevada Division of Water Resources (DWR) on April 2, 2010, there are no
 9 domestic water supply wells currently in use that are located near the regional PCE plume
 10 located in the area. The single irrigation well located down gradient of the sites that has been
 11 impacted as a result of improper well construction had reported concentrations in 2006 that were
 12 below EPA's Maximum Contaminant Level (MCL) for PCE of 5 micrograms per liter (ug/l) [See
 13 **Ex. D**, NDEP, 2007].

14 13. Concentrations of PCE in soil beneath the APTC site are generally low, below 10
 15 milligrams per kilogram (mg/kg). These levels are below those levels that would impact
 16 groundwater at concentrations that could result in unacceptable concentrations in vapors that
 17 might impact residences and industrial workers. Concentrations in groundwater need to be over 17
 18 mg/kg before they have the potential for impacting residences above EPA risk based screening levels as
 19 can be predicted using EPA's Johnston and Ettinger Model. (See Ex. E, Howe, April, 2010). Using
 20 the conservative default parameters in the Johnson and Ettinger Model (1991), groundwater
 21 concentrations that would result in a concentration in indoor air that would exceed the EPA 10^{-4} cancer
 22 risk based screening level for indoor air of 41 ug/m^3 would be 872 ug/l. Using the minimum dilution
 23 attenuation factor (DAF) of 20 times accepted by NDEP (See Ex. F, NDEP, 2008) the resulting soil
 24 concentration that could result in a concentration in groundwater of 872 ug/l would be at least 20 times
 25 higher than the level of concern predicted using the Johnson and Ettinger Model or 17 mg/kg in soil. Only
 26 two samples from the same area beneath the APTC site had concentrations above this level. Suggesting
 27 the source area is very localized and will not act as a substantial source of PCE contamination now or in
 28 the future.

1 ///

2 14. Concentrations of PCE in groundwater and soil are similarly low, far below
 3 those that would indicate the potential for dense non-aqueous phase liquids (DNAPLs) to be
 4 present beneath the former APTC facility. DNAPLs can represent substantial long term sources
 5 for PCE to groundwater. However, PCE is essentially the only organic contaminant found in the
 6 shallow groundwater beneath the APTC facility. This means that there are no other contaminants
 7 that can compete for sorption or solubility and reduce the concentration in soil and groundwater
 8 that can be associated with the presence of DNAPL. Therefore, if DNAPL were present the
 9 expected concentrations in groundwater associated with DNAPL would approach the theoretical
 10 solubility for PCE of 150,000 ug/l (Cohen, R.M. and Mercer, 1993). Using conservative inputs
 11 the Massachusetts Department of Environmental Protection (MDEP) estimates that the soil
 12 saturation index for PCE based on EPA's Soil Screening Guidance (EPA, 1996) should be
 13 around 366,000 micrograms per kilogram (ug/kg) (See
 14 <http://www.mass.gov/dep/service/compliance/riskasmt.htm>). This concentration is more than
 15 double the highest concentration for PCE of 120,000 ug/kg found beneath the APTC site (See
 16 **Ex. G**, URS, 2007b). DNAPL is generally not present in soil if the concentration of PCE does
 17 not exceed the soil saturation index.

18 15. The highest detected concentrations for PCE measured in shallow groundwater
 19 in the area are not beneath the former APTC facility. Below the Boulevard Mall, near another
 20 potential source area, located near well MW-13, the maximum concentration of PCE was
 21 detected in groundwater at 5,300 ug/l (See **Ex. H**, Converse Consultants, 2010). These
 22 concentrations measured in well MW-13 do not approach the theoretical solubility for PCE of
 23 150,000 ug/l that would be representative of the presence of DNAPL (Cohen, R.M. and Mercer,
 24 1993). In fact, this maximum concentration is less than 4 percent of the theoretical solubility,
 25 which implies that DNAPL is not present at any of the currently identified or other suspected
 26 source areas near the regional PCE plume.

27 16. There are many factors that can influence the concentrations in groundwater that
 28 are in equilibrium with a DNAPL mixture, but by far the greatest potential impacts can be

attributed to the presence of significant quantities of other organic contaminants, usually hydrocarbons, that compete for solubility sites in the water. This phenomenon according to EPA is known as effective solubility and is related to the mole fraction or percentage that a specific compound makes up in a DNAPL mixture (See <http://www.epa.gov/athens/learn2model/part-two/onsite/es.html>).

6 17. Based on my review of the chromatograms and analytical results from the PCE
7 plume in the Area surrounding the MSSC and the Boulevard Mall very few chemicals or other
8 hydrocarbon mixtures are present except PCE in the shallow groundwater. The effective
9 solubility of PCE in groundwater near a DNAPL should approach the theoretical solubility of
10 150,000 ug/l. No concentrations measured from the area for PCE come close to this level,
11 therefore it is certain that a persistent DNAPL related source is not present in and surrounding
12 the former APTC facility.

13 18. Because no persistent DNAPL source is present beneath the Former APTC
14 facility and data for groundwater in wells in the area suggest that the plume is stable, there is no
15 reason to believe that PCE contaminated shallow groundwater present beneath the area will
16 migrate to where contamination could impact human health and the environment.

**THE POTENTIAL FOR A THREAT TO HUMAN HEALTH FROM PCE IN INDOOR
AIR DOWNGRADIENT OF THE MARYLAND SQUARE SITE HAS NOT BEEN
SUBSTANTIATED**

19. EPA Office of Solid Waste and Emergency Response (OSWER) Draft Guidance
20 for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (See
21 Subsurface Vapor Intrusion Guidance, 2002) suggests a three tiered approach to the estimation of
22 risk associated with vapor intrusion.

24 20. In EPA's approach initial screening that has no specific requirements is followed
25 by a Tier II approach in which groundwater, soil gas, and geologic information are collected to
26 define critical conditions at the site. These conditions control the reliability of modeled results,
27 which are then used to identify where Tier III activities should be conducted.

28 21. In Tier III detailed site specific pathway information is suggested for collection

1 along with sub-slab sampling and indoor air sampling to evaluate if there is a potential that risks
 2 could potentially exceed a calculated risk in the range between the 10^{-4} to 10^{-6} carcinogenic risk
 3 values or a non carcinogenic risk quotient of greater than 1.

4 22. In the DoD Vapor Intrusion Handbook (See January, 2009, page 27, Table3-1) the
 5 Tr-Services Environmental Risk Assessment Workgroup points out that individual indoor air
 6 samples may not be representative of long term exposure concentrations. Further on page 28 of
 7 the guidance the work group states, that multiple samples of indoor air should be collected from
 8 various areas of a home to support risk assessment needs. They further recommend that samples
 9 be collected from indoor air during periods of the year when heating is likely to be occurring and
 10 periods of the year when air conditioning or no heating is occurring. In doing so indoor air
 11 values can be averaged more reliably for supporting a risk assessment.

12 23. Page 33 of this guidance specifically states that multiple lines of evidences need
 13 to be used before it can be determined that the vapor intrusion pathway is complete and a risk is
 14 posed at a site. These multiple lines of evidence include the following: concurrent indoor and
 15 outdoor air sampling, impacts from geology, results of a risk assessment, sub-slab data and,
 16 many other factors (See DoD Vapor Intrusion Handbook, January, 2009).

17 24. At the request of NDEP, and on the behalf of DCI, the former operator of the
 18 APTC facility, URS did some limited groundwater and soil vapor analyses over a small portion
 19 of the potentially impacted residential area (See Ex. I, URS 2007a).

20 25. A review of this work indicates groundwater well installations and vapor probe
 21 locations were not evenly spaced across the impacted area and the data are insufficient to
 22 account for impacts from the highly variable geology present in the area above the PCE
 23 groundwater plume. In addition, NDEP used default modeling parameters to estimate the
 24 potential for impacts to the nearby residences (personal communication Steven Geyer from
 25 NDEP (Mary Siders) March 3, 2010). These defaults would have been inherently unreliable
 26 because of the high degree of heterogeneity of geology in soil from the area.

27 26. The geology at the site varies from clay to sand over very short distances and
 28 because of these conditions site specific data will be needed before model estimates can be

1 reflective of actual site conditions. The NDEP also selected an arbitrary action level modified
2 after a New Jersey Depart of Environmental Protection (NJDEP) screening criteria and not EPA
3 human health risk based action levels.

4 27. NDEP has evaluated vapor intrusion in the project area by collecting single point
5 24 hour time weighted averages from biased locations where cracks in a sub-slab or other
6 building weaknesses were identified using a photo ionization detector (See Ex. J, Broadbent and
7 Associates Inc., July 2008). The initial sampling events were conducted from September 2007
8 through March 2008 at 97 residential properties. A single outdoor air sample was collected near
9 one residence and no sub-slab or near sub-slab data was collected.

10 28. During this process NDEP failed to follow EPA and other relevant state and
11 publicly available guidelines for evaluating risk associated with vapor intrusion. They did so by
12 biasing sampling locations and not simultaneously collecting additional site specific pathway
13 data. They also failed to collect sub-slab data based on reliable modeling results that took into
14 account site specific geology or soil type as suggested by EPA (See EPA, 2002).

15 29. The sampling methods and protocols NDEP used to evaluate vapor-related issues
16 in this portion of the project area were not appropriate for the collection of data that are
17 representative of actual site conditions. This is based on the fact that (1) sample collection was
18 limited to a single biased sample from each home, (2) potential background concentrations of
19 PCE within and outside each home before or during sampling were not evaluated appropriately,
20 and (3) samples were also not collected at multiple times of the year to develop representative
21 estimates of PCE concentrations in indoor air for evaluating long term risks of exposure to
22 residences.

23 30. The Interstate Technology and Regulator Council (See ITRC, 2007) and DoD
24 (DoD, 2009) guidance on evaluating risks associated with vapor intrusion indicate that data
25 should be collected from the time of the year when heating is occurring, as a worst case scenario
26 and also again when air conditioning may be occurring, as a best case and the data combined for
27 use in a risk assessment. No such paired data sets were collected from residences in the area and
28 no risk assessment has been performed, even though it was noted that cooling systems in the

1 homes had a substantial impact on the sub-slab depressurization systems installed in 14 homes at
 2 the site (See Ex. K, Broadbent, 2010). The increase in pressure caused by air conditioning and
 3 the fact that it reduced the efficiency of sub-slab depressurization systems in certain homes
 4 suggests that concentrations in homes during months of the year when air conditioning is in use
 5 could be much lower than those measured during the brief winter months when heating is needed
 6 in the Las Vegas area.

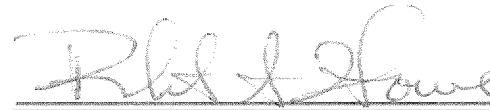
7 31. The NDEP screening level of 32 micrograms per meter cubed ($\mu\text{g}/\text{m}^3$) was
 8 selected based on conversations between NDEP and the New Jersey Department of
 9 Environmental Protection (NJDEP) in December of 2008. During this discussion, NJDEP noted
 10 that they have a rapid action level of 30 $\mu\text{g}/\text{m}^3$, which is in part based on sub-slab data.
 11 However, no sub-slab data had been collected at the plaintiffs' properties at the time when NDEP
 12 applied their adopted action level. The NJDEP uses their rapid action level primarily to identify
 13 the need to collect additional data.

14 32. In a letter dated March 17, 2009 (See Ex. L, Robertson and Vick, page 2), notes
 15 that EPA's Office of Solid Waste and Emergency Response recommends using a concentration
 16 in indoor air of 1.2 $\mu\text{g}/\text{m}^3$, corresponding to the 10^{-6} cancer risk level using the California EPA
 17 Inhalation Unit Risk (IUR), as a point of departure for determining remediation goals. EPA
 18 considers remediation goals in the range 10^{-6} to 10^{-4} when arriving at action levels for PCE sites
 19 taking into account the design of homes, background concentrations, and many other factors.
 20 This suggests that an action level in the range from 1.2 (10^{-6} risk) and 120 (10^{-4} risk) $\mu\text{g}/\text{m}^3$
 21 should be considered for the MSSC site. No reported results from the site currently exceed the
 22 10^{-4} risk threshold of 120 $\mu\text{g}/\text{m}^3$ put forth by Robertson and Vick (See Ex. C, Howe, March
 23 2010).

24 33. Therefore, until sufficient indoor and outdoor air, soil and soil gas data, and a risk
 25 assessment is performed no mitigation actions should have been considered based on the
 26 arbitrary action level of 32 $\mu\text{g}/\text{m}^3$ selected by NDEP and the default parameters and incomplete
 27 data sets used to evaluate the need for action. The potential for a threat to human health from
 28 PCE in indoor air down gradient of the Maryland Square site has not been substantiated.

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2 34. I declare under penalty of perjury that the foregoing is true and correct.
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5 Date: June 21st, 2010.
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11 Robert Howe
12 Tetra Tech EM, Inc.
13 4900 Pearl East Circle
14 Suite 200
15 Boulder, CO 80301
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REFERENCES

Broadbent & Associates, Inc., Indoor Air Sampling Report Maryland Square PCE Site, Las Vegas, Nevada, July, 2008.

Broadbent & Associates, Inc., Indoor Air Mitigation and Sampling Report for the Maryland Square PCE Site, Las Vegas, Nevada, March, 2010.

Cohen, R.M., and Mercer, DNAPL Site Evaluation, CRC Press, Boca Raton, FL, 1993.

Converse Consultants, Groundwater Monitoring Report - 4th Quarter 2009, Maryland Square Shopping Center, January 13, 2010.

Department of Defense (DoD), DoD Vapor Intrusion Handbook, The Tri-Service Environmental Risk Assessment Workgroup, January, 2009.

Howe, R., Expert Report Letter to Dongell, Lawrence and Finney LLP c/o Mr. Tom Vandenburg: Expert Report of Robert A. Howe, Former Maryland Square Shopping Center, 3661 S. Maryland Parkway, Las Vegas, Nevada, March 8, 2010.

Howe, R., Expert Report Letter to Dongell, Lawrence and Finney LLP c/o Mr. Tom Vandenburg: Rebuttal Report of Robert A. Howe, Former Maryland Square Shopping Center, 3661 S. Maryland Parkway, Las Vegas, Nevada, April 7, 2010.

ITRC, Technical and Regulatory Guidance, Vapor Intrusion Pathway: A Practical Guideline, February 2007.

Johnson and Ettinger, User's Guide for Evaluating Subsurface Vapor Intrusion Into Buildings, 1991.

NDEP, Letter to Health, Safety & Environmental Director, DCI Management Group Ltd. c/o Mr. Randall Jackson: Groundwater Data from Golf Course Well PW-1, February 27, 2007.

NDEP, Guidance Document, Development of Site-Specific Impact to Ground Water Soil Remediation Standards Using the Soil-Water Partition Equation, December 2008 revised.

OGI Environmental LLC, Letter to NDEP c/o Dr. Mary Siders: Results of Offsite Investigation, Former Dr. Clean Facility, 1195 E. Desert Inn Rd., Las Vegas, NV, NDEP ID#: H-000510, January 11, 2010.

Robertson and Vick, Letter to NDEP c/o Greg Lovato: Regarding Peter J. Voggenthaler, et al. v. Maryland Square, NDEP ID No.: H-000086, March 17, 2009.

URS Corporation, Report of Off-Site Soil Vapor Assessment, Former Al Phillips Facility, April 13, 2007a.

URS Corporation, Source Area Soil Assessment Report, Former Al Phillips Facility, February 23, 2007b.

US EPA, Soil Screening Guidance: Technical Background Document, Office of Emergency Response, Washington DC. EPA/540/R95/128, 1996.

USEPA, OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, (Subsurface Vapor Intrusion Guidance), November 2002.

Zikmund, K., Extent and Potential Use of the Shallow Aquifer and Wash Flow in Las Vegas Valley, Nevada, SNWA, 1996.